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UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Attorney Docket No.	
First Inventor	RAJA SINGH TULI
Title	REMOTE DATA PROTOCOL
Express Mail Label No.	

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

ADDRESS TO: Assistant Commissioner for Patents
Box Patent Application
Washington, DC 20231

1. [✓] Fee Transmittal Form (e.g., PTO/SB/17) *(Submit an original and a duplicate for fee processing)*
2. [✓] Applicant claims small entity status. See 37 CFR 1.27.
3. [✓] Specification [*Total Pages* 18]
   (preferred arrangement set forth below)
   - Descriptive title of the invention
   - Cross Reference to Related Applications
   - Statement Regarding Fed sponsored R & D
   - Reference to sequence listing, a table, or a computer program listing appendix
   - Background of the Invention
   - Brief Summary of the Invention
   - Brief Description of the Drawings *(if filed)*
   - Detailed Description
   - Claim(s)
   - Abstract of the Disclosure
4. [✓] Drawing(s) *(35 U.S.C. 113)* [*Total Sheets* 7]
5. Oath or Declaration [*Total Pages* 2]
   a. [✓] Newly executed (original or copy)
   b. [ ] Copy from a prior application (37 CFR 1.63 (d)) *(for continuation/divisional with Box 17 completed)*
      i. [ ] DELETION OF INVENTOR(S)
      Signed statement attached deleting inventor(s) named in the prior application, see 37 CFR 1.63(d)(2) and 1.33(b).
6. [ ] Application Data Sheet. See 37 CFR 1.76
7. [ ] CD-ROM or CD-R in duplicate, large table or Computer Program *(Appendix)*
8. Nucleotide and/or Amino Acid Sequence Submission *(if applicable, all necessary)*
   a. [ ] Computer Readable Form (CRF)
   b. Specification Sequence Listing on:
      i. [ ] CD-ROM or CD-R (2 copies); or
      ii. [ ] paper
   c. [ ] Statements verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

9. [ ] Assignment Papers (cover sheet & document(s))
10. [ ] 37 CFR 3.73(b) Statement *(when there is an assignee)* [ ] Power of Attorney
11. [ ] English Translation Document *(if applicable)*
12. [ ] Information Disclosure Statement (IDS)/PTO-1449 [ ] Copies of IDS Citations
13. [ ] Preliminary Amendment
14. [ ] Return Receipt Postcard (MPEP 503) *(Should be specifically itemized)*
15. [ ] Certified Copy of Priority Document(s) *(if foreign priority is claimed)*
16. [ ] Other: .....

17. If a CONTINUING APPLICATION, *check appropriate box, and supply the requisite information below and in a preliminary amendment, or in an Application Data Sheet under 37 CFR 1.76:*

[ ] Continuation [ ] Divisional [ ] Continuation-in-part (CIP) of prior application No.: _____ / _____

Prior application information: Examiner _____ Group / Art Unit. _____

For CONTINUATION OR DIVISIONAL APPS only: The entire disclosure of the prior application, from which an oath or declaration is supplied under Box 5b, is considered a part of the disclosure of the accompanying continuation or divisional application and is hereby incorporated by reference. The incorporation can only be relied upon when a portion has been inadvertently omitted from the submitted application parts.

18. CORRESPONDENCE ADDRESS

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Signature		Date	28 SEPT, 2000.

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FEE TRANSMITTAL for FY 2000

Patent fees are subject to annual revision.

TOTAL AMOUNT OF PAYMENT ($) 345.-

Complete if Known	
Application Number	
Filing Date	
First Named Inventor	RAJA SINGH TULI
Examiner Name	
Group Art Unit	
Attorney Docket No.	

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1. ☐ The Commissioner is hereby authorized to charge indicated fees and credit any overpayments to:
   Deposit Account Number
   Deposit Account Name
   ☐ Charge Any Additional Fee Required Under 37 CFR 1.16 and 1.17
   ☐ Applicant claims small entity status. See 37 CFR 1.27

2. ☑ **Payment Enclosed:**
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FEE CALCULATION

1. BASIC FILING FEE

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
101	690	201	345	Utility filing fee	345.-
106	310	206	155	Design filing fee	
107	480	207	240	Plant filing fee	
108	690	208	345	Reissue filing fee	
114	150	214	75	Provisional filing fee	

SUBTOTAL (1) ($) 345.-

2. EXTRA CLAIM FEES

		Extra Claims		Fee from below		Fee Paid
Total Claims	7	-20** =		X	=	∅
Independent Claims	3	- 3** =		X	=	∅
Multiple Dependent					=	∅

**or number previously paid, if greater; For Reissues, see below

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description
103	18	203	9	Claims in excess of 20
102	78	202	39	Independent claims in excess of 3
104	260	204	130	Multiple dependent claim, if not paid
109	78	209	39	** Reissue independent claims over original patent
110	18	210	9	** Reissue claims in excess of 20 and over original patent

SUBTOTAL (2) ($) ∅

FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
105	130	205	65	Surcharge - late filing fee or oath	
127	50	227	25	Surcharge - late provisional filing fee or cover sheet	
139	130	139	130	Non-English specification	
147	2,520	147	2,520	For filing a request for *ex parte* reexamination	
112	920*	112	920*	Requesting publication of SIR prior to Examiner action	
113	1,840*	113	1,840*	Requesting publication of SIR after Examiner action	
115	110	215	55	Extension for reply within first month	
116	380	216	190	Extension for reply within second month	
117	870	217	435	Extension for reply within third month	
118	1,360	218	680	Extension for reply within fourth month	
128	1,850	228	925	Extension for reply within fifth month	
119	300	219	150	Notice of Appeal	
120	300	220	150	Filing a brief in support of an appeal	
121	260	221	130	Request for oral hearing	
138	1,510	138	1,510	Petition to institute a public use proceeding	
140	110	240	55	Petition to revive - unavoidable	
141	1,210	241	605	Petition to revive - unintentional	
142	1,210	242	605	Utility issue fee (or reissue)	
143	430	243	215	Design issue fee	
144	580	244	290	Plant issue fee	
122	130	122	130	Petitions to the Commissioner	
123	50	123	50	Petitions related to provisional applications	
126	240	126	240	Submission of Information Disclosure Stmt	
581	40	581	40	Recording each patent assignment per property (times number of properties)	
146	690	246	345	Filing a submission after final rejection (37 CFR § 1.129(a))	
149	690	249	345	For each additional invention to be examined (37 CFR § 1.129(b))	
179	690	279	345	Request for Continued Examination (RCE)	
169	900	169	900	Request for expedited examination of a design application	

Other fee (specify) _____

* Reduced by Basic Filing Fee Paid

SUBTOTAL (3) ($) ∅

SUBMITTED BY				Complete (if applicable)	
Name (Print/Type)	RAJA SINGH TULI	Registration No. (Attorney/Agent)		Telephone	514 871 0984
Signature				Date	28 SEPT 2000

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REMOTE DATA PROTOCOL

BACKGROUND OF THE INVENTION

Field of the Invention

The invention relates to a host computer system or server, which has a web browser running on it, and the display of the web browser is transmitted via modem and received by a cellular phone connected to a PDA device which displays the image. In particular, the Remote Data Protocol of the invention consists of multiple virtual machines which are contained in the server, and each contains a browser which has applications running in them. Multiple clients are represented by software, which sends the display of each virtual machine to the remote PDA device to be displayed, and also relays information back to the virtual machine from the PDA device.

A particular advantage of this method lies in replacing a conventional terminal on a network system with software, which communicates with the PDA device and the server.

Description of the Prior Art

Microsoft Remote Data Protocol uses a main server in which a virtual machine runs multiple applications. Each virtual machine is connected to a dedicated terminal or client, which displays the image of the virtual machine. The advantage of this is to avoid a dedicated computer with application programs for each client, where multiple clients may access applications on a server. All data processing is done in the sever and displayed on terminals, which is a cheaper solution for multiple clients using this Remote Data Protocol. The terminals allow keyboard and mouse commands to be transferred to the server on a network system.

SUMMARY OF THE INVENTION

The present invention relates to multiple portable high speed Internet access PDA (Personal Digital Assistant) devices that can access the Internet and World Wide Web as wireless devices, using a RDP (Remote Data Protocol) client and sever system to facilitate multiple PDA users simultaneously on a single server.

A principal embodiment has a Web server connected to the Internet. This server contains a virtual browser that takes the image displayed in the browser and converts this image into a bit map which is compressed, and communicates via telephone lines to a cellular telephone. The cellular telephone is connected to a high speed internet access device commonly referred to as a PDA (Personal Digital Assistant) which is comprised of a display screen, battery and related micro-electronics. This enables the PDA to receive, decompress and view the bit map image sent from the virtual browser, and more importantly, through cellular phone connectivity to be able to input data or commands from the PDA directly onto the server. The host computer or server receives vector information or compressed data in the form of HTML, JPEG, etc., which is displayed on a web page. The virtual browser virtually displays a virtual image on the server. That image, in whole or in parts, is recompressed and sent to the PDA. In particular, the host computer contains an RDP server which has multiple virtual machines contained within, with each virtual machine containing a web browser. Multiple RDP clients interact with the virtual machines with a dedicated virtual machine for each client on the server. Each client is represented by software, which sends the display of the virtual machine to a single remote PDA device via a dedicated modem port. This modem port allows two way communication between a single PDA and a dedicated virtual machine on the server, via a single RDP client. By implementing multiple virtual machines and multiple RDP clients with multiple modem ports, it is now possible to communicate with multiple users of PDA devices on the RDP server to facilitate Internet browsing, electronic message communication, etc. The RDP client relays information received via a modem

port from the PDA, such as mouse clicks or keyboard commands, to the application program in the virtual machine, which is then processed and a refreshed display sent back to the PDA via the same dedicated RDP client and modem port. The browser on a virtual machine relays display information to the dedicated RDP client such as bitmap files, vector files, commands, buffer information, etc. The RDP client then rasterizes some of the information by drawing it into memory and then proceeds to break up this file into smaller blocks of information. These blocks are compressed and sent to the PDA device through a dedicated modem port connected to each RDP client. The PDA would then receive, decompress and assemble the blocks of information in the original order as first received by the RDP client before the RDP client breaks up into smaller blocks. The browser running in each virtual machine rasterizes most of the information which is sent to the RDP client such as text, etc., but the RDP client may have to rasterize other information such as blocks, etc.

The PDA sends specific data to the virtual machine informing of the current location of the displayable area of the PDA screen with respect to the larger image sent from the browser. This is necessary, as the area displayed by the PDA is smaller than the displayable image on the browser window. The RDP client would send compressed blocks of data representing the image to be displayed in order of priority, such that the first blocks sent to and decompressed by the PDA are in the displayable area of the PDA, which is the current area where the user is viewing. The PDA would then decompress blocks surrounding the displayed area in a particular sequence, such as left to right across rows, and store the image in internal memory. The PDA assembles blocks of the image in a virtual page, which comprises the entire image, thus enabling the user to access any part of the present image without communicating constantly with the RDP client. Hence, as the user scrolls across the image in any direction, the blocks of data comprising the image would already be decompressed and assembled priority-wise for instant viewing. Blocks of the image in closer proximity to the displayed area of the PDA screen get decompressed and stored

into internal memory on higher priority than blocks further away. The PDA continuously sends its current location to the virtual machine on the server to keep getting refreshed data instantaneously as the location changes by the user scrolling or sending commands. This enables a rapid refresh rate of the displayed image especially when scrolling, as areas surrounding the displayed image would be decompressed and already stored in memory.

A mouse click or any keyboard command is given priority in communication between the PDA and the RDP server. Such actions from the PDA are sent instantaneously, interrupting the current activities and this action directed to the web browser on the dedicated virtual machine, which sends a refreshed image back to the PDA device. This feature allows the user to have rapid response to commands. If the user initiates a mouse click or keyboard command on the PDA that does not change the displayed image on the RDP server, then the original activities are continued almost instantly with minimum interruption. However, if the image is changed and refreshed on the RDP server, any old image being sent is stopped and the new image is sent immediately to the PDA if it is a full screen image occupying all or part of the PDA display screen. If the refreshed image sent occupies a part of the PDA display screen and also areas outside the display screen, then the portion of the refreshed image that is displayed on the PDA display screen is sent first to the PDA, and blocks of the image are sent to the PDA which are decompressed and stored in internal memory, in order of priority closest to the displayed image, as previously described. Hence the PDA would assemble blocks of the image in the virtual page, which comprises the entire image, starting first with the current location of the PDA display screen then areas around it.

A beacon is sent form the PDA device to the RDP client and vice-versa many times per minute to confirm that a connection is established and maintained, for the duration of use. In the instance a user is disconnected, either the PDA or the RDP client will not receive a beacon and a time-out will be

initiated, whereby both the PDA and RDP client disconnect and then reconnect. The user would still be able to view the present image and scroll around it as this image would already be decompressed in order of priority and stored in internal memory. The PDA would indicate in a message area that a reconnect sequence was initiated, and the status of this connection to the same RDP client as before, which would refresh the PDA with the image if it has changed once reconnection is established. Similarly, the PDA would continue downloading blocks of information after being reconnected if a disconnection interrupted this operation. A beacon is not necessarily sent from the RDP client at times when it is sending information to the PDA. As long as the PDA is receiving information such as a refreshed image, or a beacon, it knows a connection is established. Consequently, when there is no new activity in the virtual machine, the RDP client must send a beacon to the PDA to confirm the connection is established. The PDA device must always send beacons to the RDP client, as commands are not sent frequently from the PDA and only for a short duration when sent.

An error protocol is implemented to verify that all information blocks are received and can be decompressed successfully. As previously described, the image displayed in the virtual browser in the virtual machine on the RDP server is broken down into smaller blocks of information and compressed and transmitted to the PDA device. The blocks are then assembled in correct sequence, decompressed and stored in internal memory on the PDA. Each block of information received is acknowledged by the PDA, which sends a signal confirming that each block is successfully received. Hence, the RDP client can monitor the successful decompression of all blocks of information sent to the PDA, and would know when a block is not acknowledged. The RDP client would also inform the PDA of the number of transmitted blocks of information, with each block identified numerically. The PDA also initiates another error protocol when a block of information received can not be successfully decompressed and stored in memory. In this case, the PDA would send an error message to the RDP client informing which block of information needs to be sent again, and the

RDP client would send this block after it has completed sending the current block of information. The RDP client would monitor the acknowledgement of all blocks of information successfully decompressed, including blocks sent again after receiving error messages from the PDA device.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention is described in more detail below with respect to an illustrative embodiment shown in the accompanying drawings in which:

Fig. 1 illustrates Prior Art whereby a PDA device is connected to a cellular phone, which communicates wirelessly to a Host Computer.

Fig. 2 illustrates Prior Art of a Remote Data Protocol system.

Fig. 3 illustrates the displayable area of the PDA device with respect to portions of the image, which are sequentially decompressed prior to viewing.

Fig. 4 illustrates the Remote Data Protocol of the present invention.

Fig. 5 illustrates a block diagram of the virtual page with respect to the viewing area of the PDA.

Fig. 6 illustrates the error protocol as blocks of information are sent from the RDP client to the PDA device.

Fig. 7 illustrates communication methods between remote devices and host computers.

Fig. 8 illustrates a wireless communication method between the PDA and the Host Computer in accordance with another embodiment of the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

To facilitate description, any numeral identifying an element in one figure will represent the same element in any other figure.

The principal embodiment of the present invention aims to provide a system that allows multiple users operating PDA (Personal Digital Assistant) devices similar to a palm top computer to access the Internet or the World Wide Web (WWW), as demonstrated in **Fig. 4**. It is a further aim of the present invention, to provide a RDP (Remote Data Protocol) client and sever system to facilitate multiple PDA users simultaneously on a single server.

Prior art is disclosed in **Fig. 1** where Microsoft Remote Data Protocol is demonstrated, using a main RDP server **1** in which virtual machines **2** exist capable of running multiple application programs **3**. Each virtual machine **2** is connected to a dedicated terminal **5** or client on a network system **4**, which displays the image of the virtual machine. The terminals **5** on the network allow input of keyboard **6** and mouse **7** commands to the RDP server **1**, with all data processing done on the server and displayed on the terminals. In this method of prior art, the RDP clients are the terminals on the network. In the present invention however, the RDP clients are represented by software which interact between the virtual machines on the RDP server and the PDA devices which display the image of the RDP clients, in a completely different fashion.

A general description of the Prior Art is disclosed in **Fig. 2** with further reference to Patent Applications 09/496,172, 09/501,585, 09/504, 809, 09/504,808, and 09/504,807. A host computer **8** is depicted which is connected to the Internet, and that host may also be a Web server. Running in the host computer, is a Web server program **9**. When a remote user **10** requests to view a Web page (or electronic message etc.) the Web server software receives HTML, JAVA, or other types of information and transmits this information to another software, the

Browser Translator **11**. This software translates the information, (i.e. the entire image comprising graphics and text) received in the form of HTML, Java, etc. (as information may be gathered from different sources) and translates it to a black and white bit map or raster image. In another embodiment, the software translates the information into a raster or color image. The image contains the information that would normally be displayed on a single Web page. The translation program therefore, also acts as a virtual browser. The cellular telephone **12** of **Fig. 2** is connected to the high speed internet access device **13** of the invention commonly referred to as a PDA (Personal Digital Assistant) which is comprised of a display screen **14**, battery and related micro-electronics. This enables the PDA to receive, decompress and view the bit map image sent from the virtual browser, and more importantly, through cellular phone connectivity to be able to input data from the PDA directly onto the server **8**. In particular, the host computer or server of **Fig. 2** and **Fig. 4** receives vector information or compressed data in the form of HTML, JPEG, etc., which is displayed on a web page. The virtual browser virtually displays a virtual image on the server by rasterizing the image, or decompressing parts of the image and putting it into memory. That image, in whole or parts, is recompressed and sent to the PDA. The recompressed data format sent to the PDA, is not necessarily in the same format as the compressed data format first received by the server. For example, the incoming data from a Web page may be in the form of JPEG which is decompressed and displayed on the virtual browser. This data is recompressed and sent to the PDA but can be in the form of TIFF G4 or other formats, and not necessarily JPEG as initially received.

Another embodiment of the invention involves the server receiving vector information such as HTML or text and then rasterizing it to bit map format. It can then be shown in memory through the virtual browser and is recompressed through a "loss less" method and sent to the PDA.

The information is received by the device **13** in **Fig. 2**, which has the ability to display a monochrome or color image **15**, in its display window **14.** The information is decompressed and displayed in the order of priority such that part of the image **17** of **Fig. 3**, which substantially or completely covers the displayable area **14** of the device, is decompressed and displayed first and then sequentially the portions **18, 19** and **20** of the image are decompressed, and stored in an internal memory of the device to be displayed later when the user scrolls up, down, or sideways to these parts of the image.

A principle embodiment of the present invention of **Fig. 4** contains the host computer **21** which contains an RDP server **22** which is a software unit having multiple virtual machines **23** contained within, with each virtual machine containing a web browser **24**. Multiple RDP clients **25** interact with the virtual machines with a dedicated virtual machine for each RDP client. Each RDP client **25** is represented by software, which sends the display of each virtual machine **23** to a single remote PDA device **26** via a dedicated modem port **27**. Each modem port **27** allows a two-way communication between a single PDA **26**, connected to a cellular phone **64**, and a dedicated virtual machine **23** on the RDP server, via a single dedicated RDP client **25**. By implementing multiple virtual machines and multiple RDP clients with multiple modem ports, it is now possible to communicate with multiple users of PDA devices on the RDP server to facilitate Internet browsing, electronic message communication, etc. The RDP client **25** relays information received from the PDA **26**, such as mouse clicks or keyboard commands, via a modem port **27** to the Browser **24** in the virtual machine **23**, which is then processed and a refreshed display sent back to the PDA via the same dedicated RDP client and modem port. The browser on each virtual machine relays display information to the dedicated RDP client such as bitmap files, vector files, commands, buffer information, etc. The RDP client then rasterizes some of the information by drawing it into memory and then proceeds to break up this file into smaller blocks of information. These blocks are compressed and sent to the PDA device through a dedicated modem port

connected to each RDP client, as further illustrated in **Fig. 5**. The PDA would then receive, decompress and assemble the blocks of information in the original order as first received by the RDP client before the RDP client breaks up into smaller blocks. The browser running in each virtual machine rasterizes most of the information which is sent to the RDP client such as text, etc., but the RDP client may have to rasterize other information such as blocks, etc.

The PDA **26** of **Fig. 4** sends specific data to the virtual machine **23** informing of the current location of the displayable area **14** of the PDA screen with respect to the larger image or virtual page **28** sent from the browser to the RDP client then to the PDA, as illustrated in **Fig. 5**. This is necessary, as the area displayed **14** by the PDA is smaller than the displayable image on the RDP client, referred to as the virtual page **28**. The dedicated RDP client would send compressed blocks of data representing the image to be displayed in order of priority, such that the first blocks sent to and decompressed by the PDA are in the displayable area **14** of the PDA, which is the current area where the user is viewing. The PDA would then decompress blocks surrounding the displayed area **14** in a particular sequence, such as left to right across rows, and store the image in internal memory. The PDA assembles blocks of the image in a virtual page **28** stored in the PDA's internal memory, which comprises the entire image, thus enabling the user to access any part of the present image without communicating constantly with the RDP client. Hence, as the user scrolls across the image in any direction, the blocks of data comprising the image would already be decompressed and assembled priority-wise for instant viewing. Blocks of the image in closer proximity to the displayed area of the PDA screen get decompressed and stored into internal memory on higher priority than blocks further away. To explain in detail by referring further to **Fig. 5**, the image displayed on the PDA screen **14** can be comprised of blocks **48, 49, 50, 53, 54 & 55**, which are sent from the RDP client first to the PDA, decompressed and then stored into memory first on the PDA. Then blocks **42, 43, 44, 45, 47, 52, 57, 58, 59 & 60** would be sent immediately after in that order from the RDP client to the

PDA, to be decompressed and stored in the PDA's internal memory. This enables a rapid refresh rate of the displayed image especially when scrolling, as areas surrounding the displayed image would be decompressed and already stored in memory. The PDA continuously sends its current location to the RDP client to keep getting refreshed data instantaneously, should the location change by the user scrolling around or outside the virtual page **28**, to enable the RDP client to always have the viewing area and surrounding blocks sent to the PDA.

A mouse click or any keyboard command on the PDA is given priority in communication between the PDA and the RDP server. Such actions from the PDA are sent instantaneously, interrupting the current activities and this action directed to the web browser on the dedicated virtual machine, which sends a refreshed image back to the PDA device through the RDP client. This feature allows the user to have rapid response to commands. If the user initiates a mouse click or keyboard command on the PDA that does not change the displayed image on the RDP server, then the original activities are continued almost instantly with minimum interruption. However, if the image is changed and refreshed on the RDP server, any old image being sent is stopped and the new image is sent immediately to the PDA if it is a full screen image occupying all or part of the PDA display screen. If the refreshed image sent occupies a part of the PDA display screen and also areas outside the display screen, then the portion of the refreshed image that is displayed on the PDA display screen is sent first to the PDA, and blocks of the image surrounding the PDA displayed image are sent next to the PDA which are decompressed and stored in internal memory, as previously described. Hence the PDA would assemble blocks of the image in the virtual page, which comprises the entire image, starting first with the current location of the PDA display screen then areas around it.

A beacon is sent from the PDA device to the RDP client and vice-versa many times per minute to confirm that a connection is established and maintained, for the duration of use. In the instance a user is disconnected, either

the PDA or the RDP client will not receive a beacon and a time-out will be initiated, whereby both the PDA and RDP client disconnect and then reconnect. The user would still be able to view the present image and scroll around it as this image would already be decompressed in order of priority and stored in internal memory. The PDA would indicate in a message area that a reconnect sequence was initiated, and the status of this connection to the same RDP client as before, which would refresh the PDA with the image if it has changed once reconnection is established. Similarly, the PDA would continue downloading blocks of information after being reconnected if a disconnection interrupted this operation. A beacon is not necessarily sent from the RDP client at times when it is sending information to the PDA. As long as the PDA is receiving information such as a refreshed image, or a beacon, it knows a connection is established. Consequently, when there is no new activity in the virtual machine, the RDP client must send a beacon to the PDA to confirm the connection is established. The PDA device must always send beacons to the RDP client, as commands are not sent frequently from the PDA and only for a short duration when sent.

An error protocol is implemented to verify that all information blocks are received and can be decompressed successfully. As previously described, the image displayed in the virtual browser in the virtual machine on the RDP server is broken down into smaller blocks of information and compressed and transmitted to the PDA device. The blocks are then assembled in correct sequence, decompressed and stored in internal memory on the PDA. Each block of information received is acknowledged by the PDA, which sends a signal confirming that each block is successfully received. Hence, the RDP client can monitor the successful decompression of all blocks of information sent to the PDA, and would know when a block is not acknowledged. The RDP client would also inform the PDA of the number of transmitted blocks of information, with each block identified numerically. The PDA also initiates another error protocol when a block of information received can not be successfully decompressed and stored in memory. In this case, the PDA would send an error message to the

RDP client informing which block of information needs to be sent again, and the RDP client would send this block after it has completed sending the current block of information. The RDP client would monitor the acknowledgement of all blocks of information successfully decompressed, including blocks sent again after receiving error messages from the PDA device. To illustrate this further, reference is made to **Fig. 6** which shows a string of data blocks **61** to be sent from the RDP client to the PDA device. As the PDA receives the data blocks acknowledgements or error messages **62** are sent back to the RDP client. Since the RDP client responds to all data from the PDA, the string of data blocks actually sent from the RDP client to the PDA is represented by **63**. To further explain the events of the RDP client **63**, blocks **31, 32, 33 & 34** are sent in this order from the RDP client to the PDA, with successful acknowledgements **ack31 & ack32** sent from the PDA to the RDP client, but whilst block **34** is being sent, an error message in block **33** is relayed from the PDA, resulting in the RDP client sending this block **33** again as soon as block **34** is sent. The RDP client resumes sending blocks **35, 36** and **37**, but notices no acknowledgement for block **35** after receiving successful acknowledgements **ack34 & ack36** sent from the PDA, which results in the RDP client sending block **35** after block **37** is sent. The RDP client may also respond faster or slower to acknowledgements or error messages as described above.

The current embodiment as illustrated in **Fig. 7** teaches of a standard serial connection **66** between the PDA device **13** and a cellular phone **12**, with an AT command set for communicating between modems. This allows the cellular phone **12** to act as a modem in communicating with another modem **65** attached to the host computer **8**. Web pages **67** received from the Internet are converted to G4 files **68** then sent via modem to the PDA device.

For a different type of cellular phone that does not allow AT command set communication but provides a TCPIP Internet connection, another embodiment of the invention is disclosed, as illustrated in **Fig. 8**. The PDA device would

contain a browser to be able to view images sent by the host computer, which may be connected to the Internet. In this case, the PDA device **13** would contain a mini-browser, which understands and is capable of translating compressed G4 images. The PDA is connected to a cellular phone **12**, which is connected to an Internet Service Provider (providing standard Internet services) instead of a modem at the Host Computer. The Host Computer is connected to the Internet and translates all web pages **67** to G4 compressed files **69**. These G4 compressed files **69** are sent to the PDA in Internet protocol via the Internet Service Provider, and the mini-browser in the PDA is capable of translating the received images, and displaying on the PDA screen. Hence, the Host Computer has Internet images coming in and also Internet images being sent out. The Internet Service Provider (ISP) that the PDA connects to would always log on to one web page, and when the user at the PDA wants to go to a link or to a different web page, the click or the information is sent through the ISP to the host computer which will load the new page. This allows multiple users to dial up the Internet Service Provider to be able to view web pages from the Internet as desired, in this manner.

CLAIMS

I claim:

1. A host computer which contains a server comprising software, in which multiple virtual machines each comprising software contains a web browser, whereby each virtual machine communicates with a dedicated client comprising another software which converts information received to a raster image, which is compressed and sent in a specific order to a dedicated modem port.

2. A portable display device remotely connected which communicates with a dedicated client, receives compressed files from the host computer, and displays decompressed said files stored into internal memory in the specific order sent.

3. A device as claimed in Claims **1** and **2** whereby the display area of the portable device is smaller than the decompressed images stored in internal memory, such that the location of the display area is relayed to the client which sends compressed images in this area first then surrounding areas after.

4. A device as claimed in Claims **1** and **2** whereby a mouse click or keyboard command from the portable display device is relayed immediately to the client, which sends a new image from the web browser to the portable display device if required, otherwise original activities are resumed.

5. A device as claimed in Claims **1** and **2** whereby beacons are relayed between the portable display device and the client to confirm a telephone connection is established, such that a beacon not received is interpreted as a disconnection and a reconnection sequence to the same client is initiated.

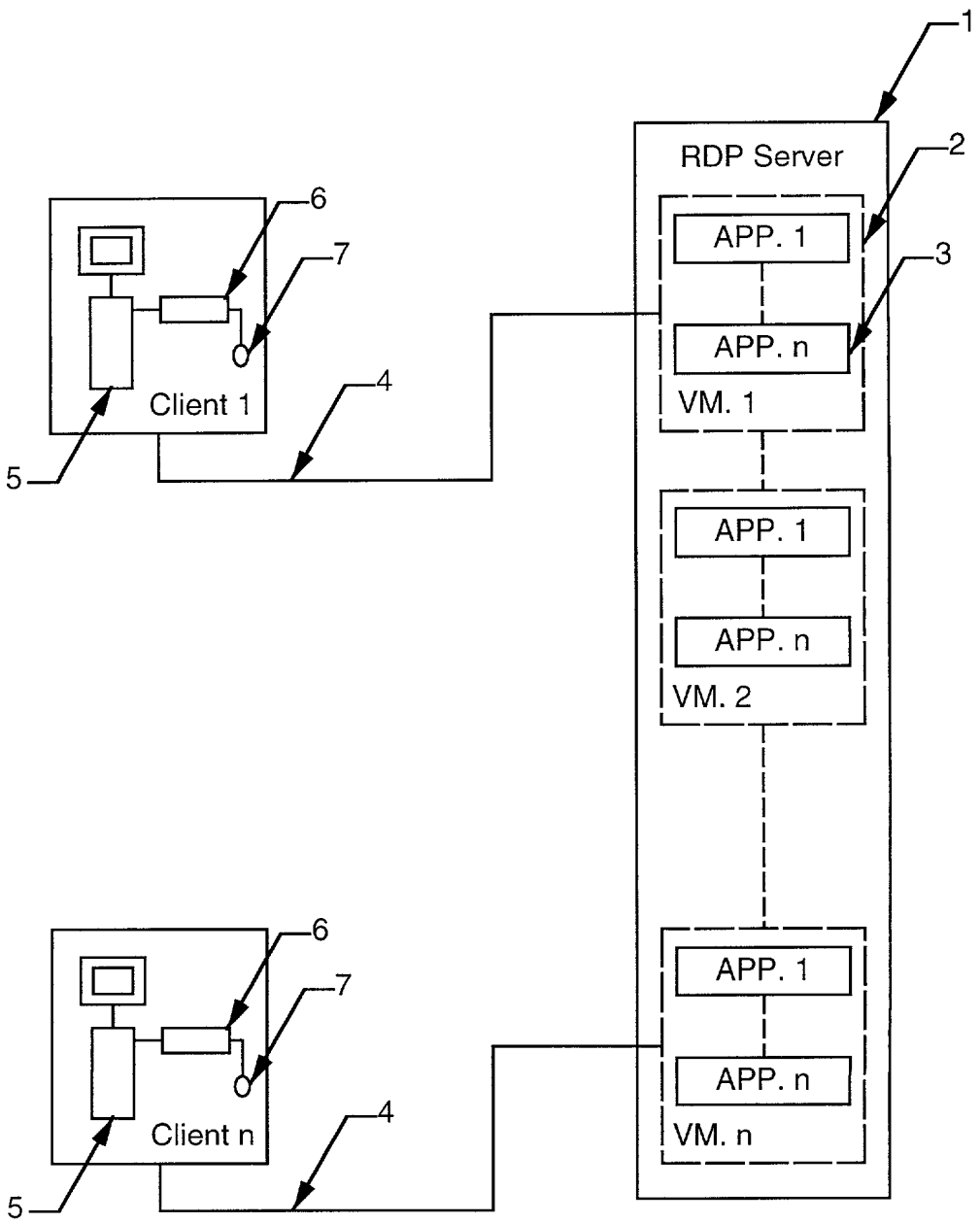
6. A device as claimed in Claims **1** and **2** whereby an error protocol verifies all files sent from the client to the portable display device are successfully received, decompressed and acknowledged by the portable display device

such that any files containing errors or files not received are sent again and placed in the corrected location.

7. A host computer which contains a server comprising software, in which multiple virtual machines each comprising software contains a web browser, whereby each virtual machine communicates with a dedicated client comprising another software which converts information received to a raster image, which is compressed and sent over the Internet to be viewed by a portable device comprising a display screen and related micro-electronics which can log on to the host computer and is able to decompress that image and display it on the display screen.

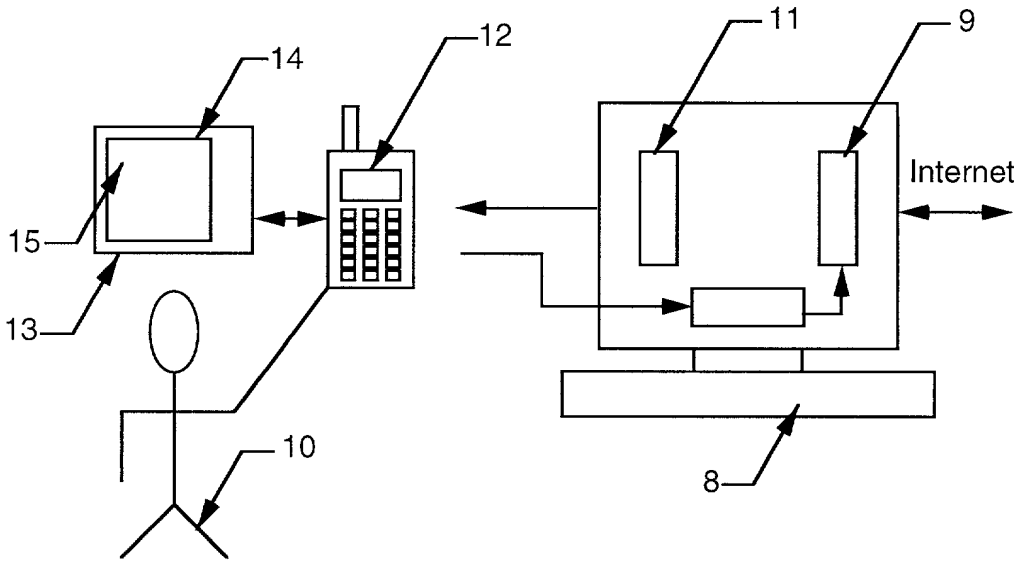
ABSTRACT

The present invention aims to provide a system that allows multiple users operating a PDA (Personal Digital Assistant) to access the Internet or the World Wide Web (WWW), and to be able to view and interact with these images remotely on a display screen. It is a further aim to provide a RDP (Remote Data Protocol) client and sever system to facilitate multiple PDA users simultaneously on a single server. The host computer contains an RDP server which has multiple virtual machines contained within, with each virtual machine containing a web browser. Multiple RDP clients interact with the virtual machines with a dedicated virtual machine for each client on the server. Each client is represented by software, which sends the display of the virtual machine to a single remote PDA device via a dedicated modem port. This modem port allows two way communication between a single PDA and a dedicated virtual machine on the server, via a single RDP client. By implementing multiple virtual machines and multiple RDP clients with multiple modem ports, it is now possible to communicate with multiple users of PDA devices on the RDP. The RDP client relays information received via a modem port from the PDA, such as mouse clicks or keyboard commands, to the application program in the virtual machine, which is then processed and a refreshed display sent back to the PDA via the same dedicated RDP client and modem port.



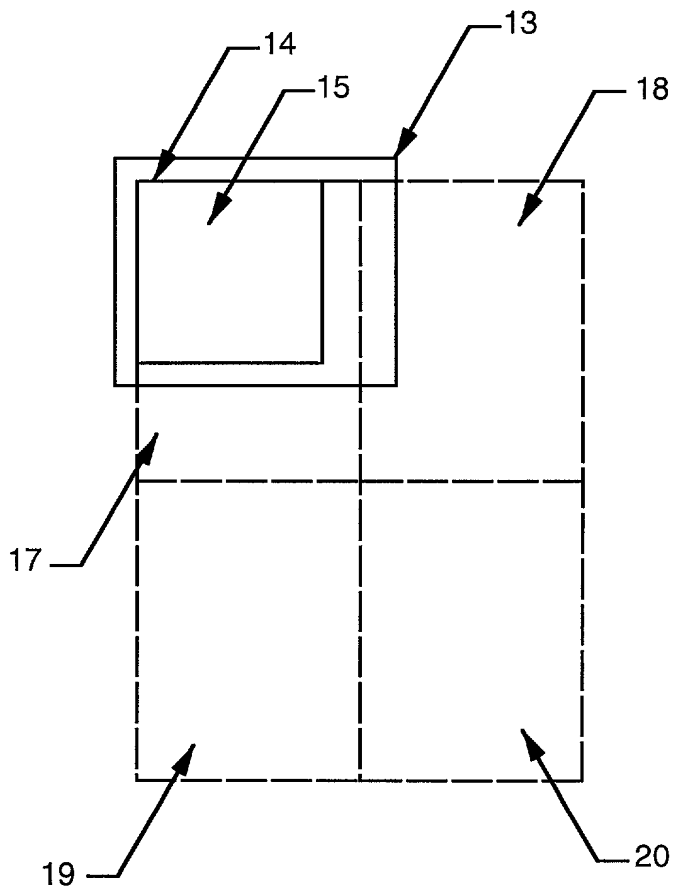
PRIOR ART

Fig. 1



PRIOR ART

Fig. 2



PRIOR ART

Fig. 3

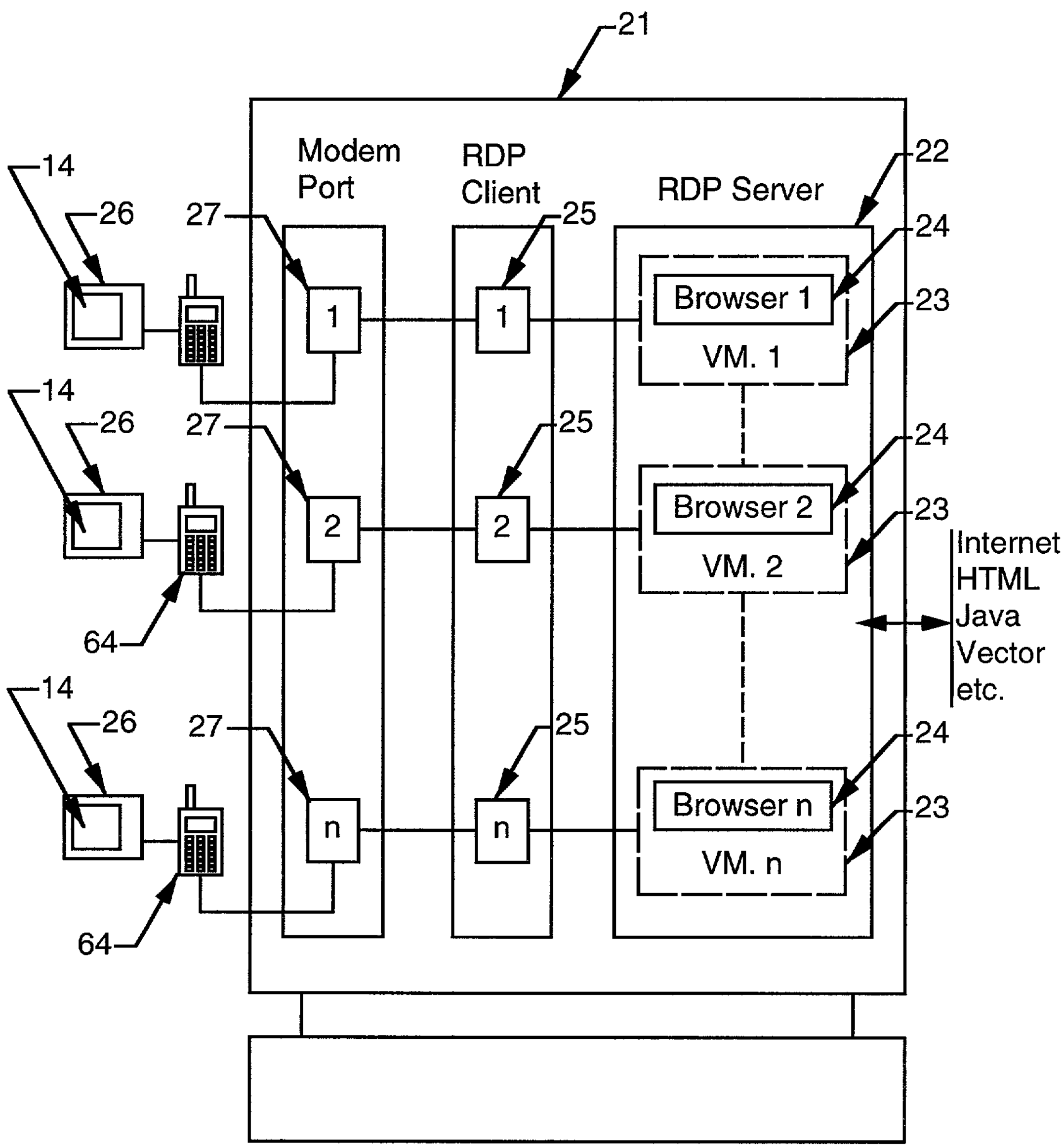

21
Modem Port
RDP Client
RDP Server
22
14
26
27
25
24
23
Browser 1
VM. 1
1
2
n
Browser 2
VM. 2
Browser n
VM. n
Internet
HTML
Java
Vector
etc.
64

Fig. 4

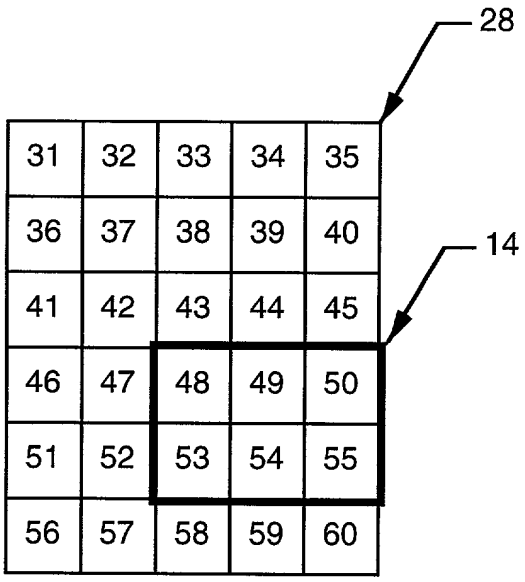

28
14
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Fig. 5

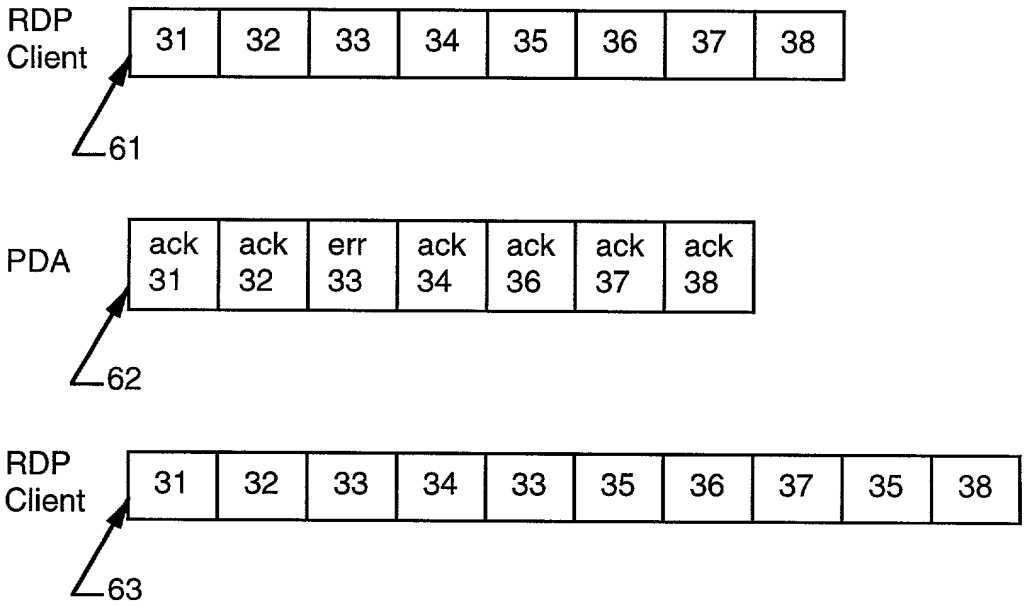
RDP Client
31
32
33
34
35
36
37
38
61
PDA
ack 31
ack 32
err 33
ack 34
ack 36
ack 37
ack 38
62
RDP Client
31
32
33
34
33
35
36
37
35
38
63

Fig. 6

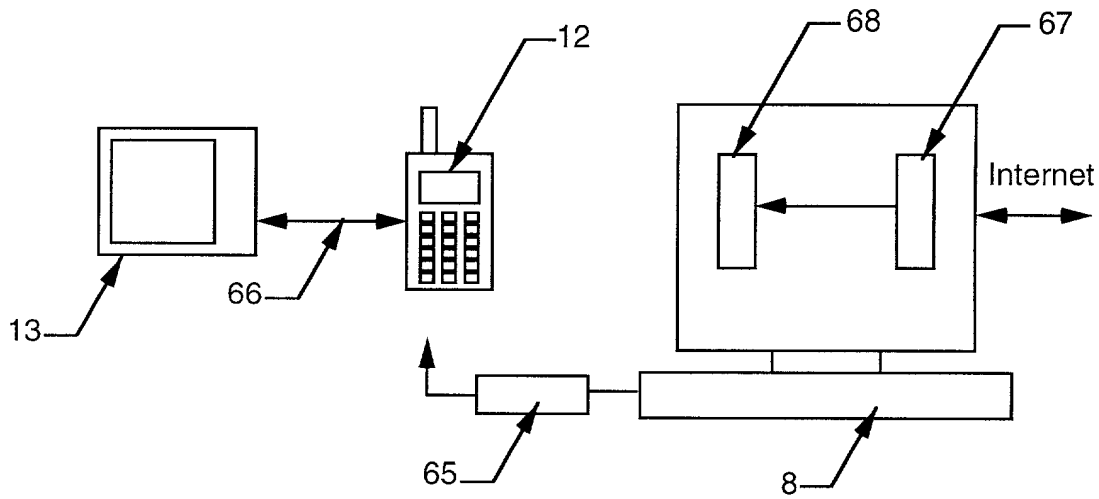
12
68
67
Internet
13
66
65
8

Fig. 7

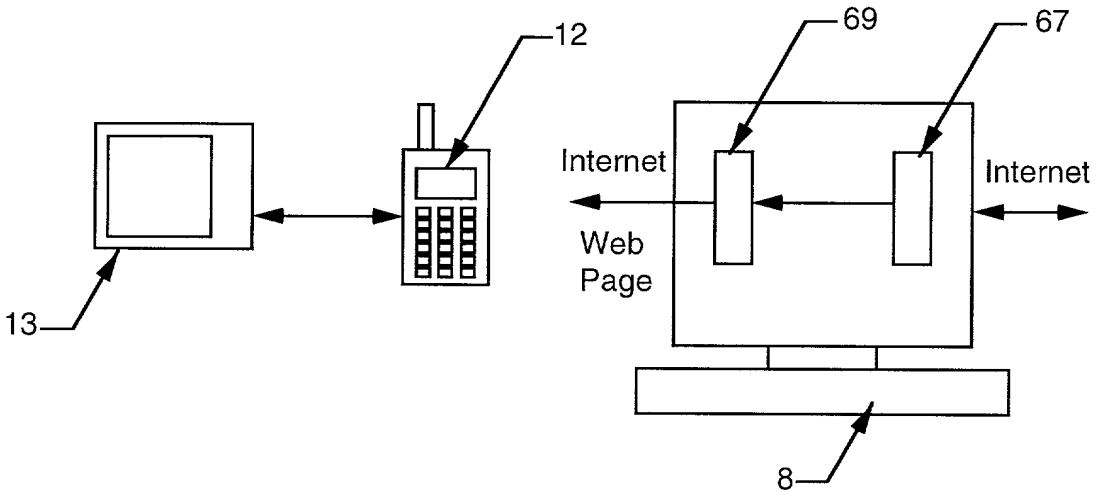
12
69
67
Internet
Internet
Web
Page
13
8

Fig. 8

Please type a plus sign (+) inside this box → ⊞

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DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION (37 CFR 1.63)

☐ Declaration Submitted with Initial Filing **OR** ☐ Declaration Submitted after Initial Filing (surcharge (37 CFR 1.16 (e)) required)

Attorney Docket Number	
First Named Inventor	
COMPLETE IF KNOWN	
Application Number	/
Filing Date	
Group Art Unit	
Examiner Name	

As a below named inventor, I hereby declare that:

My residence, post office address, and citizenship are as stated below next to my name

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled.

REMOTE DATA PROTOCOL

(Title of the Invention)

the specification of which
☑ is attached hereto
OR
☐ was filed on (MM/DD/YYYY) ____ as United States Application Number or PCT International Application Number ____ and was amended on (MM/DD/YYYY) ____ (if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1 56

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate, or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or of any PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application Number(s)	Country	Foreign Filing Date (MM/DD/YYYY)	Priority Not Claimed	Certified Copy Attached? YES	NO
			☐	☐	☐
			☐	☐	☐
			☐	☐	☐
			☐	☐	☐

☐ Additional foreign application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto

I hereby claim the benefit under 35 U.S.C. 119(e) of any United States provisional application(s) listed below.

Application Number(s)	Filing Date (MM/DD/YYYY)	
		☐ Additional provisional application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto.

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DECLARATION — Utility or Design Patent Application

I hereby claim the benefit under 35 U.S.C. 120 of any United States application(s), or 365(c) of any PCT international application designating the United States of America, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. 112, I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application.

U.S. Parent Application or PCT Parent Number	Parent Filing Date (MM/DD/YYYY)	Parent Patent Number *(if applicable)*

☐ Additional U.S. or PCT international application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto

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☐ Customer Number → *Place Customer Number Bar Code Label here*

OR

☐ Registered practitioner(s) name/registration number listed below

Name	Registration Number	Name	Registration Number

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Direct all correspondence to: ☐ Customer Number or Bar Code Label ____ *OR* ☐ Correspondence address below

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Country	CANADA	**Telephone**	514 871 0984	**Fax**	514 871 3864

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Name of Sole or First Inventor: ☐ A petition has been filed for this unsigned inventor

Given Name (first and middle [if any])	Family Name or Surname
RAJA SINGH	TULI

Inventor's Signature						**Date**	28SEP/00
Residence: City	MONTREAL	**State**	QUEBEC	**Country**	CANADA	**Citizenship**	CAN.
Post Office Address	1155 RENE LEVESQUE WEST						
Post Office Address	SUITE 3500						
City	MONTREAL	**State**	QUEBEC	**ZIP**	H3B 3T6	**Country**	CANADA

☐ Additional inventors are being named on the ____ supplemental Additional Inventor(s) sheet(s) PTO/SB/02A attached hereto